8 Cross-Cutting Enterprise Enablers

This chapter describes foundational elements of our solution that are not confined to a single "tower" of government functions, but instead cut across functions and help to build the enterprise. In our experience, cross-cutting functions like architectures and data management tremendously enhance and facilitate any reengineering or re-solutioning that takes place.

We propose three key cross-cutting offerings:

- **Business Intelligence.** Our concept for business intelligence is to design and structure an enterprise approach to turning data into information for use by managers and planners across the Commonwealth. Our approach begins with implementation of functional reporting solutions that correspond to each of the VEAA solutions. In addition, we recommend the establishment of an Enterprise Information Center of Excellence. The purpose of this Center will be to aggregate data across functions for use in policy and program development and budgeting. This approach to business intelligence will provide several benefits. First, it focuses on meeting the granular operational reporting needs of each functional area, providing functional managers with the information they need to conduct daily activities. Second, this approach enables an understanding of management across functional areas. Gradually this allows management to become more proactive, rather than reactive, when planning budgets and establishing new policies and programs.
- **Service-Oriented Architecture.** We recommend that the Commonwealth move toward a service-oriented architecture (SOA) to facilitate its Enterprise Applications Architecture. Service-oriented architectures model the enterprise as a collection of reusable services that are available across the enterprise—well-defined, self-contained, and universally available business functions that respond to service requests from users. This architecture provides a toolset to quickly integrate legacy as well as new applications into an enterprise model. Most of the enterprise-class applications available in the marketplace today offer web services that will quickly plug into the VEAA service-oriented architecture.
- **Single Window Government.** We propose CGI's Single Window Government (SWG) as a means to establish an operational service-oriented architecture and environment. The primary purpose of SWG is to consolidate the various "windows" of government such that the user is presented with a single window, enabling a view of and access to all services, irrespective of the access method. Single Window Government will initially take an inward facing approach and will start by offering a rapid deployment of self-help service for the employee evaluation process, thereafter expanding to other similar employee-based functionality.

This approach will also install a very important building block to the foundation of the VEAA and will later serve as the springboard to offering a wide array of service delivery improvements throughout the enterprise.

Each of these cross-cutting initiatives will offer the ability to deliver real benefits to the users in a relatively short time frame, and set the stage for what is to come when the full VEAA is implemented. They offer early deployment of capabilities and proof of concept, and they can help to enlist early support by delivering real and meaningful benefits to the employee base. We believe that these elements of our solution are vital to the proper beginning of the effort and look forward to discussing them in more detail with the Commonwealth as we blend them into the existing technical environment.

8.1 Business Intelligence

The Commonwealth of Virginia has a clear vision for continuous improvement of government operations and service delivery to citizens. Through establishment of a better framework for decision making and increased accountability throughout government operations, the Commonwealth can not only improve on already outstanding government practices, but proactively meet the next generation of issues, problems, and concerns. In this manner, the Commonwealth can continuously improve operations and service delivery, enhancing the value of the state as an ideal destination to live and to work.

Success in establishing a more effective framework for decision making requires enhanced timeliness and accuracy of information. The first step is to make sure that basic operational reports are available within each functional area. However, the information infrastructure should gradually advance from measurement and reporting on previous operations to include predictive capabilities as well.

A business intelligence program will make sure that there is ongoing incremental improvement in the manner and capacity in which information is used.

Such commitment to increasing management capabilities requires an ongoing business intelligence program. Business intelligence is about getting the right information to the right people at the right time. It establishes the framework for decision making that is necessary for the Commonwealth to meet its goals. A business intelligence program will make sure that there is ongoing incremental improvement in the manner and capacity in which information is used. The result is that managers and executives at all levels are increasingly better prepared to meet the exigencies of their roles and to make effective managerial decisions.

Team CGI-AMS believes that business intelligence best practices can be leveraged to aggregate information to improve policy and program development. This can be done on two levels:

- As VEAA solutions are phased in, they will contain data collection and reporting components leading to enhanced information for decision making at the functional level.
- An Enterprise Information Center of Excellence can leverage data across the Commonwealth to provide Senior Leaders with the tools and knowledge to make effective cross-functional decisions.

Implementation of a business intelligence solution will lead to better targeting of investment dollars at both the tactical and strategic level.

In Virginia, no consistent process exists to aggregate information across functions.

Within the Commonwealth currently data collection and usage can be difficult due to the plethora of IT systems and processes. Furthermore, no consistent process exists to aggregate information across functions. The net result is that no clear managerial picture exists across the Commonwealth.

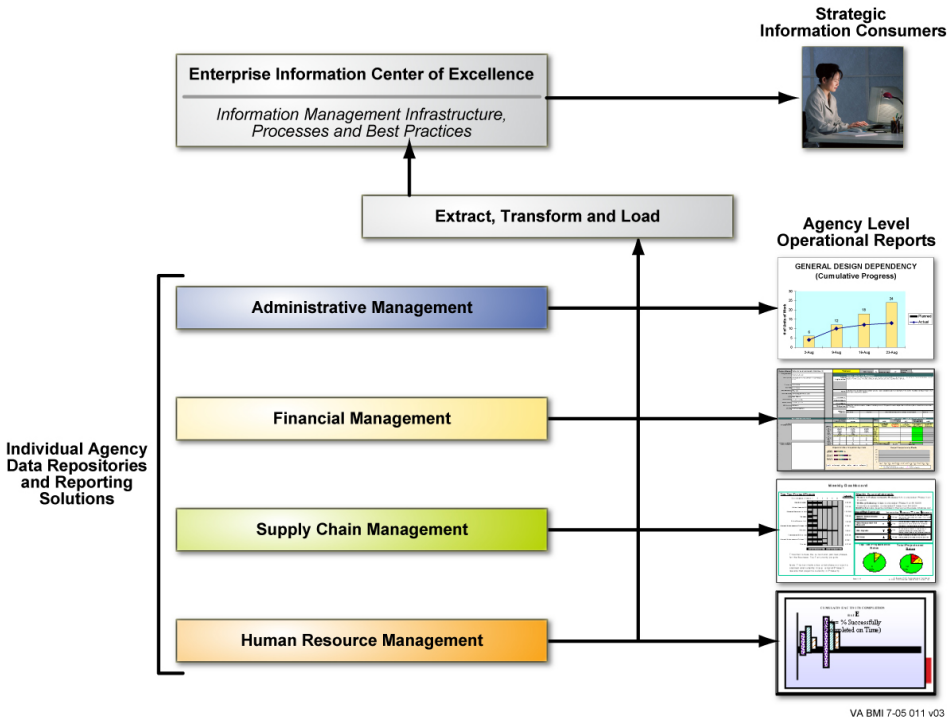
Team CGI-AMS's proposed Virginia Enterprise Applications Architecture will help the Commonwealth maintain its leading role in effective state management. The implementation of these solutions also presents an opportunity to enhance data collection and information flow to make sure that managers within functions have the tools necessary for informed decision making. A new set of operational reports will be introduced to enable managers to understand operations as managed through the VEAA. In addition, as new sources of information are developed through this program, they can be tied together for effective management across the Commonwealth.

Team CGI-AMS proposes a business intelligence framework to address the need for information management across the Commonwealth. This framework contains two key components:

- **Tactical (Operational) Reporting Solutions** – Each functional solution in the VEAA will include a tactical reporting solution appropriate to that agency, its needs, and the new IT infrastructure. This solution will be targeted to maximize critical information flow so decision makers always have the key information they need, when they need it.
- **Enterprise Information Center of Excellence** – Data will also be aggregated for use at a strategic level in the Enterprise Information Center of Excellence. As this enterprise view of the Commonwealth is developed, it will provide information necessary to improve program and policy development as well as funding decisions. The Enterprise Information Center of Excellence will also serve as a source of information management best practices, advising functional areas on information management tools and techniques.

Exhibit 8-1 below represents a pictorial solution of the desired end state.

Exhibit 8-1 Business Intelligence End State



The proposed business intelligence program provides structured information at both the agency and the strategic level for enhanced decision making.

This business intelligence solution provides a framework for the implementation of multiple reporting solutions. The overall goal is to get the right information to the right people in the right time frames and through the right channels to improve and enhance decisions. However, success rests not only on the technical infrastructure but also on an ability to understand what the right information is.

Team CGI-AMS will employ its Business Intelligence Approach on both the tactical and strategic level to define the high priority information needs. This approach will make certain that we are extracting and aggregating the key information and providing it to decision makers in a usable fashion at all levels of state management.

The CGI-AMS Business Intelligence Approach has been successfully utilized on numerous occasions for this purpose. Our approach focuses first on the management needs and objectives independent of the IT infrastructure. We then follow a top down approach to ultimately glean the data needs for each phase of the solution. This approach enables us to design and implement a solution that is consistent with the overall business objectives.

Details of the solution and information about the CGI-AMS Business Intelligence Methodology follow in subsequent sections of this chapter.

8.1.1 Current Environment

"We identified several areas where Accounts and Treasury could improve the efficiency of statewide reporting processes..."
- *Auditor of Public Accounts*[1]

In March 2005, the Auditor of Public Accounts released a *Review of Statewide Reporting Processes*. This study focused primarily on the creation of several statewide reports including the Comprehensive Annual Financial Report (CAFR) and the Statewide Schedule of Expenditures of Federal Awards (SEFA). The auditor identified several areas for improvement in the generation of these reports, including the need for more automation and more coordination of data collection across different agencies.

These areas of improvement from the Auditor were echoed during Due Diligence activities. In many cases, the Commonwealth lacks the ability to manage its functions through use of full and complete information. As a consequence, decision makers are not always well informed or prepared for the decisions that must be made.

8.1.1.1 Due Diligence Results

Although specific consequences of poor information flow were cited previously in discussions of each "tower," some general issues can be extrapolated.

- **Intensive labor is required for reporting.** Many data collection and reporting mechanisms in the agencies are based on manual, rather than automated reporting mechanisms. This condition increases the labor needs of reporting. Ultimately this means that agencies are spending money on data collection that could better be focused on analysis activities. The Team CGI-AMS business intelligence solutions will automate data entry and manipulation wherever possible.
- **Manual data collection and reporting hinders accuracy and timeliness of data.** Extensive manual manipulation of data can lead to a larger percentage of reporting errors than would occur in an automated process. In addition, the manual nature of these processes in some agencies can be time consuming. The end result is that management often must make decisions based on information that is old or stale, and in some cases not accurate. The Team CGI-AMS focus on automated reporting solutions would alleviate these issues.
- **Management actions are not always based on measurable criteria.** In many cases Key Performance Indicators (KPIs) have not been identified and are not being tracked and used in decision making. The Team CGI-AMS business intelligence solutions will define business objectives and related KPIs to improve the objectivity of management decision making.
- **Information cannot be aggregated due to a lack of data standards.** A current lack of data standards exists across some functions. As a result, management cannot gain a true picture of the effectiveness of operations. This issue causes an impediment for management when trying to measure across functions. Wherever possible the Team CGI-AMS business intelligence solutions would establish data standards, enabling management across functions.

[1] *Review of Statewide Reporting Processes*, Auditor of Public Accounts, March 2005.

- **Senior executives for the Commonwealth do not have consistent visibility into the effectiveness of policies and programs across functions.** No consistent mechanism exists to integrate enterprise data. Program and policy development often occur despite the lack of information. Team CGI-AMS's proposed Enterprise Information Center of Excellence will establish the infrastructure and processes to enable a cross functional view of the Commonwealth, leading to more effective investments.

The proposed Team CGI-AMS Business Intelligence framework will address these issues.

8.1.1.2 Other Considerations

On July 30, 2002, President Bush signed the American Competitiveness and Corporate Accountability Act, more generally known as Sarbanes-Oxley. The law requires that publicly traded companies adhere to significant new governance standards in financial management and accountability.

Sarbanes-Oxley does not apply to the Commonwealth of Virginia or other states. However, it does represent a management trend where all organizations, both public and private, are expected to have access to timely and accurate data for greater accountability and effective decision making. This trend is particularly true in management of financial data.

For public companies, compliance with Sarbanes-Oxley requires improved information management and business intelligence solutions to make sure of the accuracy and completeness of data. As a byproduct, many companies believe this will lead directly to increased efficiency, and in the case of private companies, improved competitive positioning.

Team CGI-AMS's proposed business intelligence solutions will lead to improved accuracy and completeness of data for the Commonwealth. Virginia will be able to utilize information driven management to improve operational effectiveness and transparency of operations. Just as these improvements are aiding private corporations, they can help the Commonwealth to become more effective in overall management.

8.1.2 Business Intelligence Solutions

A study of 49 large business intelligence initiatives showed an average 5-year ROI of 114%. Primary benefits drivers were productivity gains and efficiency improvements through better decision making capabilities.[2]

Team CGI-AMS proposes to implement a business intelligence program with two key components. First is a series of tactical data repositories designed to meet the reporting needs of individual functions. These repositories will be implemented in conjunction with the VEAA solutions. Second, Team CGI-AMS also proposes to implement an Enterprise Information Center of Excellence. This Center will include the data repositories necessary to aggregate information across multiple agencies. It will also establish the standards and best practices necessary for ongoing improvement in information management across the Commonwealth.

The combination of these solutions will provide the following benefits to the Commonwealth:

- Focusing on automated solutions will lead to increased efficiency and productivity. Staff currently required to manually collect data will be able to focus on value added analysis activities.
- Automation will lead to timelier and more accurate management reports.
- The Commonwealth will have improved measurability and accountability at the tactical and strategic level. Information flow will be focused on Key Performance Indicators whenever practical.
- Aggregated data and information across functions enables more effective program and policy development.

8.1.2.1 Tactical Reporting Solutions

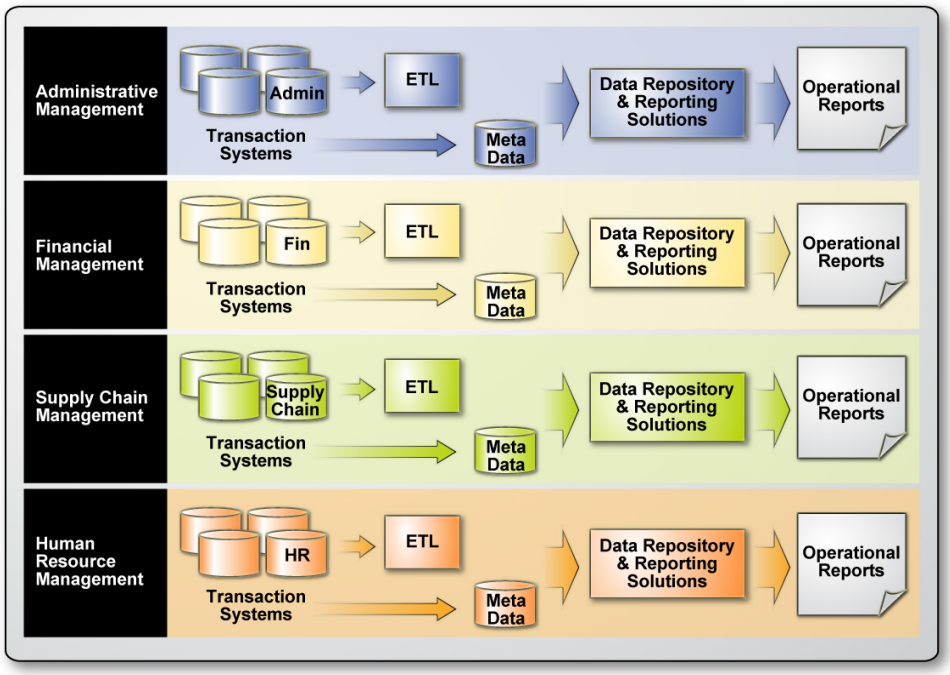
Functional tactical reporting solutions provide improved timeliness and accuracy of reports for more informed decision making, and trending capabilities for predictive analysis.

The first step in implementing the Team CGI-AMS business intelligence framework is to establish tactical reporting solutions that correspond to each initiative discussed previously. Each reporting solution will be determined during the requirements phase for each initiative. However, they will share some common elements.

Exhibit 8-2 graphically depicts the tactical reporting solutions for each tower. The primary purpose of the tactical reporting solutions is to make certain that basic operational reports are available and effective in meeting organizational needs.

[2] *SAP's Business Analytics Solution: Applying Intelligence to Drive Value Through the Enterprise*, An IDC White Paper, January 2004.

Exhibit 8-2 Tactical Reporting Solutions



The key components of the solution are as follows:

Effective metadata is particularly important in decentralized organizations such as the Commonwealth.

- **Extraction of data from transactional systems** – Data will be extracted from the necessary transactional systems via a process called Extract, Transform and Load (ETL). The key to an effective ETL process is to transform the data into a usable format and to correct data inaccuracies.
- **Data repository** – In most cases the data will be loaded into some form of data repository that is designed specifically for reporting purposes. In some cases this may involve dimensional data warehouses, but the specific repository will be designed to maximize efficiency of information flow and minimize cost for each solution area.
- **Metadata repository** – Metadata, which is commonly defined as "data about data" is essential to understanding the meaning of specific data fields and the lineage of that data. Most of the solutions will contain some type of metadata repository accessible to the end users. Effective metadata is particularly important in decentralized organizations such as the Commonwealth. Without metadata it is often difficult or impossible to know what is meant by information from different agencies. Collection of metadata is necessary for management at the agency level, but is also imperative when that information is extrapolated to the strategic level as is proposed here.
- **Reporting solutions** – In most cases reporting solutions will be established that are designed to deliver the right information to the right people at the right time through the right channel. Often these solutions will involve targeted reporting tools. However, the specific tool most appropriate to each

functional area will be determined during the requirements phase of the Initiative.

- **Operational reports** – The reporting solutions will populate a series of operational reports, tailored to the specific needs of each agency.

Tactical reporting solutions will be implemented with an enterprise view to leverage common tools where appropriate. This leads to reduced costs through economies of scale. These solutions will make certain there is access to data and contribute to effective management within each agency.

8.1.2.2 Enterprise Information Center of Excellence

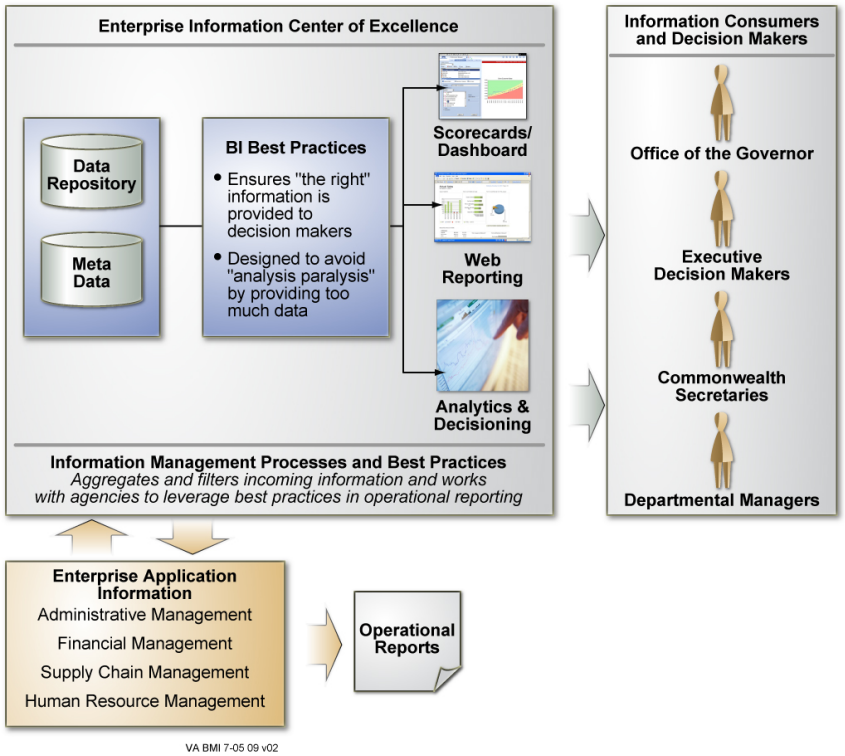
Enterprise Information Center of Excellence provides aggregated data for strategic insight.

The Team CGI-AMS business intelligence solution will include an Enterprise Information Center of Excellence designed to meet cross-functional information needs. The center will combine the physical infrastructure necessary to support cross-functional reporting and serve as the source for information management processes and best practices. In this manner the expertise of the Center can be called upon on a consultative basis to assist individual agencies in planning their information management solutions.

The Enterprise Information Center of Excellence is not designed to provide all information to all executives all the time. Instead, the goal is to understand the key information needs and provide for them. As these needs shift over time, so will the output from the Enterprise Information Center of Excellence.

Exhibit 8-3 graphically depicts the Center.

Exhibit 8-3 Enterprise Information Center of Excellence



Key components of the Enterprise Information Center of Excellence are these:

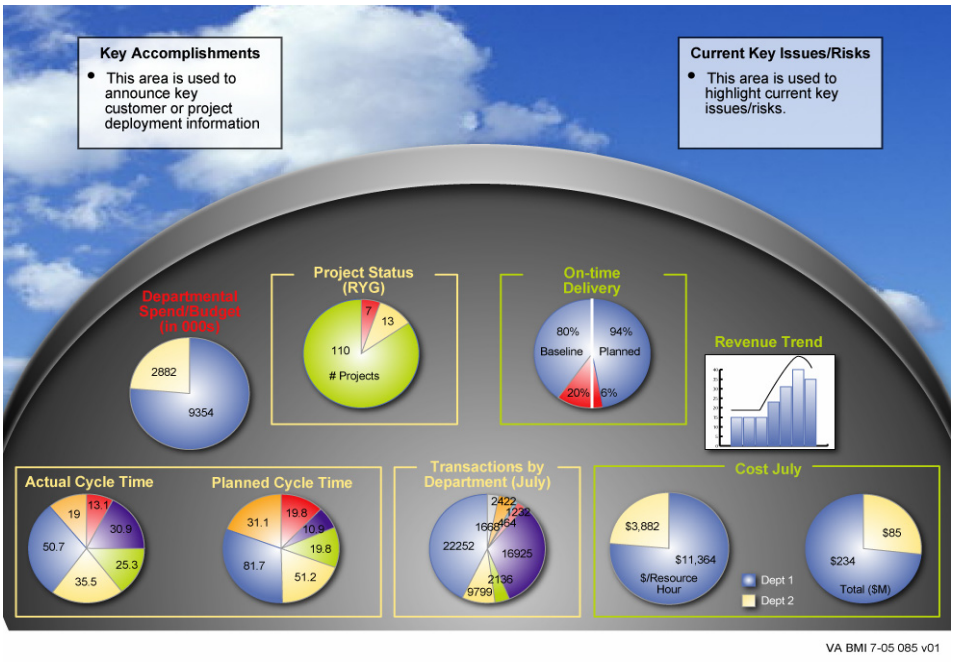
- **Data repository** – Data will be extracted from the functional areas and loaded into a common environment. New data sources that correspond to the tactical solutions will first be brought into this environment. The physical infrastructure of the data repository will be determined during a requirements gathering phase.
- **Metadata** – "Data about data" will also be collected and made available to end users. This step is critical to the success of the Center since disparate data often can have widely divergent meanings. The metadata will allow users to understand the information provided to them.
- **Reporting mechanisms (scorecards/dashboards, analytics and decisioning, and web reporting)** – Information to enhance decision making will be provided through the most appropriate format to decision makers and constituents.
- **Information management processes and best practices** – The Enterprise Information Center of Excellence will serve as an information management best practices organization for business intelligence initiatives across the Commonwealth. Specifically, Functional and Solution Architects in the Center will have two key roles:
  - **Support decision making at a strategic level.** In this manner, the center will make sure that business intelligence best practices are utilized for ongoing improvement in meeting the information needs of the Commonwealth's strategic decision makers. Business intelligence is not an end goal, but rather an ongoing process. It must be continually honed and improved for success. The key role of the Center of Excellence is to make sure that these ongoing incremental improvements continue.
  - **Support tactical initiatives within the agencies through providing as-needed consultation.** The Center will serve a key role across the Commonwealth as the advocate for information management standards and best practices. It is envisioned that the Functional and Technical Architects within the Center will review and advise on tactical reporting initiatives. In this manner the Commonwealth can benefit from a cohesive set of standards. In addition, enabling the Center to serve as a central point for business intelligence initiatives enables the opportunity to save money through gaining economies of scale across functions in business intelligence and reporting tool use.

An effective executive report or dashboard is tailored to provide key decision makers with the cost, revenue, and other information necessary to effectively manage the enterprise.

A key output of the Enterprise Information Center of Excellence will be a set of management reports and dashboards for executive decision makers. These will be tailored to specific needs of the executives during a requirements process. A process for ongoing improvement will also be established.

Exhibit 8-4 provides a sample dashboard designed for organizational executives. In this case, data was integrated from across multiple departments to provide the key decision makers with the intelligence necessary to focus their attention and to make sound decisions.

Exhibit 8-4 Sample Executive Dashboard



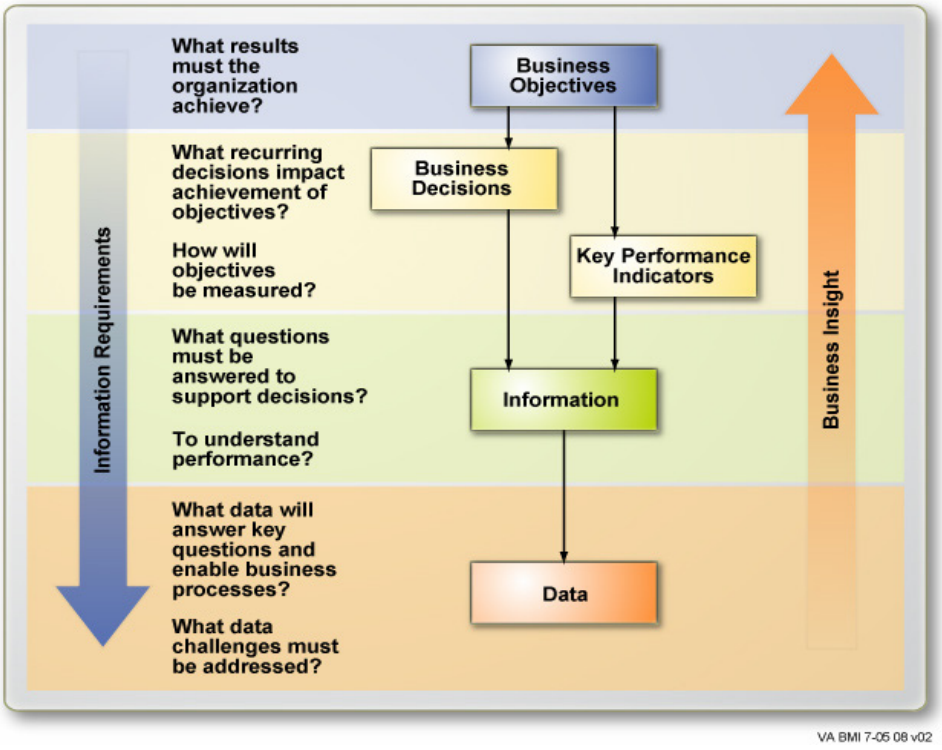
8.1.3 Team CGI-AMS Business Intelligence Approach

Use of the business intelligence implementation approach will make sure that Commonwealth objectives and management needs drive the reporting solutions.

In order to implement the business intelligence solutions, Team CGI-AMS will leverage CGI-AMS's business intelligence implementation approach. This approach works in conjunction with our standard project lifecycle methodology. It provides a framework for defining the Key Performance Indicators and understanding the detailed information needs of the organization. In this way, Team CGI-AMS maximizes investment on the most important reporting needs while providing the maximum possible business benefit.

The CGI-AMS approach is applicable to business intelligence initiatives at all levels. It follows a standard set of steps. Exhibit 8-5 shows a graphical depiction of the information value chain.

Exhibit 8-5 Business Intelligence Approach



The key steps in the CGI-AMS business intelligence approach are as follows:

- **Define the Business Objectives for the organization** – CGI-AMS's approach to business intelligence requires a definition of the key objectives for the organization for which the initiative is being developed. We typically work with the leadership of a given organization to identify and document these objectives. This step is critical to make certain that the overall initiative is scoped and focused correctly.
- **Define the key business decisions that must be made for operations and analysis** – Within each function and at the larger cross-functional level, recurring decisions must be made for effective management. Our BI approach works with managers to define and document these business decisions.
- **Define Key Performance Indicators** – A critical component of the CGI-AMS BI approach is to define the Key Performance Indicators. These should flow directly from the business objectives and recurring business decisions.
- **Define information needs** – The Key Performance Indicators enable definition of information needs. The CGI-AMS approach defines this information as the questions that must be answered to understand performance and to support decisions.
- **Understand data needs** – Once the information needs have been established, CGI-AMS then focuses on the specific data elements required to answer the questions.

This process represents the information value chain. CGI-AMS has successfully used it on numerous occasions to make sure of a focus on critical management information needs.

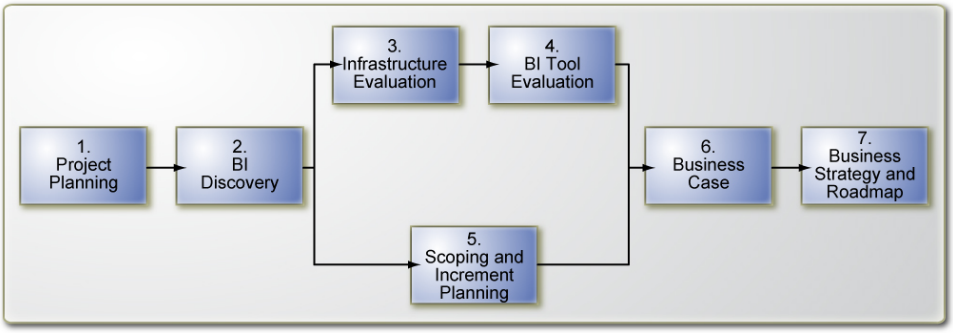
8.1.4 Implementation

Implementation of the Business Intelligence solutions and vision requires incremental work. Transformation to a fully knowledge-based environment across the Commonwealth must be done in small steps, beginning with increasing the availability of necessary operational reports within each agency.

Team CGI proposes that each aspect of the Virginia Enterprise Applications Architecture contain a corresponding reporting solution while it is being phased in. The Implementation Roadmap (described in Chapter 9) will provide guidance on this phasing.

Team CGI-AMS also proposes to begin implementation of the Enterprise Information Center of Excellence in Phase 2. This is a short-term activity. The first step in the implementation is to perform the CGI-AMS BI Strategy Assessment. Exhibit 8-6 provides an overview of these tasks.

Exhibit 8-6 CGI-AMS BI Strategy Assessment Activities



The focus of this effort is to establish the parameters and guidelines under which the Information Center of Excellence will operate, and to determine the first several sets of initiatives to be phased in. A brief overview of each activity is as follows:

- **Project planning** – Project Planning tasks involve identifying the key stakeholders and beneficiaries of the Enterprise Information Center of Excellence and establishing the detailed tasks that must be accomplished to conduct the BI Strategy Assessment.
- **BI discovery** – BI Discovery involves gaining an understanding of the overall information needs of the beneficiaries of the Center of Excellence. High level requirements will be gathered and priorities established through one or more Discovery Workshops.
- **Infrastructure evaluation** – The purpose of this activity is to identify the source data necessary to meet the requirements and determine what gaps exist. These activities will culminate with the preparation of an overall architecture for the BI Center of Excellence.

- **BI tool evaluation** – This activity involves choosing the tools most suited to the needs of the Enterprise Information Center of Excellence. These tools will be selected in conjunction with an analysis of the primary tools already in use across the Commonwealth. Please note that if complete vendor analysis is required for a type of tool not already in use within the Commonwealth, additional time may be required for this activity.
- **Scoping and increment planning** – During this activity, the high level requirements previously gathered are scoped into likely increments based on business priorities, availability of data, and cost. The plan outlines, at a minimum, the first increment, and may portray the scope and objectives for future increments. For example, it may be deemed appropriate to initially develop the infrastructure and processes to provide a specific dashboard to meet a high priority need in one area.
- **Business case** – The business case is a justification for the BI solution, and depending upon the needs of the Commonwealth, may be highly quantitative or more qualitative in its presentation. This activity establishes the rationale for moving forward with one or more discrete increments.
- **Business strategy and roadmap** – This activity summarizes the previous achievements in this phase and provides a cohesive mechanism to make certain of stakeholder understanding and buy-in prior to moving to implementation. This activity will also define the charter of the Center of Excellence in terms of the relationships it establishes with individual functional areas on tactical reporting solutions.

It is estimated that these activities will take four to six months, with a team of six FTEs. The team would be composed of the following roles:

- BI Lead / Project Manager
- BI Solution and Technical Architect
- Data Architect
- Data Analyst
- Two BI Trained Business Analysts.

Once the Enterprise Information Strategy Assessment has been completed, it is expected that the Enterprise Information Center of Excellence will officially go live. At this time the Center will begin simultaneously implementing enterprise information initiatives as defined in the Business Intelligence Roadmap and begin supporting tactical initiatives within the agencies.

From a staffing perspective, the roles listed above that would fulfill the strategy effort will continue in ongoing roles in the Enterprise Information Center of Excellence. Additional developers may also be necessary on an as needed basis to implement the initiatives defined in the Roadmap in Chapter 9.

8.1.5 Linkage to the Virginia Enterprise Applications Architecture

The Commonwealth is poised to mature in its shared use of information through commitment to a business intelligence program. Doing so will enable more effective and more proactive management of and across functions. However, true success in this endeavor requires an infrastructure that enables flexibility and

interoperability. Team CGI-AMS proposes that this occur through the implementation of a service-oriented architecture (SOA). The SOA will exploit open standards to loosely couple an open environment of services, leading to a full integration of business data, information, and technology.

Use of an SOA is a key to implementation of a strong Business Intelligence environment.

Use of an SOA is a key to implementation of a strong Business Intelligence environment. Through the SOA, data and information services can be more effectively integrated. As data repositories are established within each functional area, they can be integrated via the SOA. In this manner, functional data can be more effectively extracted and aggregated for use in the Enterprise Information Center of Excellence. For more information, please see Exhibit 8.2, Service-Oriented Architecture.

8.2 Service-Oriented Architecture

8.2.1 Introduction

A key factor for the Commonwealth in continuing as a digital government leader is to create a flexible enterprise applications architecture that promotes a culture of interoperability. Team CGI-AMS believes that the enterprise applications architecture, not just technology, is a key driver in the enterprise applications modernization effort of the Commonwealth. The enterprise applications architecture should integrate the Commonwealth's Enterprise Business Architecture (EBA) with its information technology solution planning.

To this end, Team CGI-AMS is proposing a key foundation framework for the Virginia Enterprise Applications Architecture (VEAA). This key foundation framework is a service-oriented architecture (SOA) that would evolve Virginia from its currently tightly coupled, siloed applications environment to a loosely coupled, open environment of services. These services would support Virginia's enterprise applications needs while facilitating the transition from a heavily decentralized group of legacy applications to a more efficient and cost-effective enterprise environment.

Enterprise architecture is an approach to understanding how components of an enterprise communicate, change, and function together as a whole. A fully articulated architecture constitutes an Enterprise Architecture: the integration of business, data, information, and technology as a coherent whole.

Team CGI-AMS has understood and quantified some of the key drivers within the Commonwealth that form the basis for establishing an enterprise-wide architecture:

- Provide faster, cheaper, and easier access to business information in order to accomplish the business functions of the Commonwealth.
- Leverage existing assets that represent a significant investment and contain great value to the Commonwealth. The goal is to establish an architecture that will provide the expected outcome, but the existing systems must be integrated such that, over time, they can be componentized or replaced in manageable, incremental projects.
- Allow for incremental implementations and migration of existing assets to produce incremental ROI.

- Establish a dynamic environment capable of quickly reacting to changes in business, organization, IT, and legislation.
- Rapidly integrate with new external parties and update existing external interfaces.
- Control the cost of business processes and IT development.

Some of the related information technology drivers are these:

- Include a software development environment that will be built using a standards-based architecture, promote better reuse of components and systems, allow migration of legacy assets to the architecture, and allow for timely implementation of new technologies.
- Support a wide variety of platforms, application architectures, programming languages, and communication protocols.
- Consolidate development tools and technologies.
- Improve reliability, modularity, extensibility, scalability, security, and stability of existing and new systems.
- Establish technical guidance by promoting best practices and standards.
- Integrate best of breed applications to solve business functions and replace obsolete and outdated technologies.
- Provide solutions that are based on open-standards and vendor independent implementations of those standards and specifications.

In order to address these business and information technology drivers, Team CGI-AMS is proposing a service-oriented architecture as a fundamental component of our enterprise applications architecture strategy.

8.2.2 What is SOA?

Systems that represent a significant investment but are largely fractured and isolated must somehow be brought together into a cohesive enterprise view.

The traditional architectural design was to build monolithic centralized systems on a single server or departmental systems based on a closed local area network—generally referred to as “silos” or “stovepipes.” Over time, a number of such systems evolved within the enterprise, each typically chartered and funded by a single agency using different technologies and platforms. Sharing of information was constrained and the typical integration pattern, if any, was to develop point-to-point interfaces. Interfaces were usually facilitated via the exchange of data files rather than real-time transactions. These silos were sometimes combined or integrated to produce even larger silos that were even more difficult to manage. Hence, the enterprise has to manage a highly complex applications infrastructure containing multiple interfaces with minimal application reuse and information sharing.

The Commonwealth has not been immune to this style of architecture. Systems that represent a significant investment but are largely fractured and isolated must somehow be brought together into a cohesive enterprise view, providing seamless access to all of the Commonwealth’s processing capabilities.

An effective approach to achieving integration and enabling the rapid development of new business offerings is to create a service-oriented architecture that enables interaction between the consumer (client) and back-end resources. Through this approach, back-end application functions are made available as

services. Within the context of a service-oriented architecture, services can be defined in this way:

The SOA uses open standards and technologies to establish a standard middle-tier platform across the enterprise, allowing for easy discovery and integration of services to form a business process.

- Services encapsulate reusable shared business functions.
- Services are defined by implementation-independent interfaces. The application invoking the service does not need to know the implementation nor should it rely on a specific implementation of the service. The application providing the service should be free to make changes to the implementation of a service without any impact on the applications that request the service.
- Services are loosely coupled. The objective of loose coupling is to reduce the assumptions two applications make about each other when they exchange messages. Aspects that enable loose coupling are these:
  - Asynchronous message exchange - An application that intends to invoke a service provided by another application should not have to rely on the other application (or communication path to it) to be available at the time of making the request. Hence, messages are exchanged in an asynchronous manner between applications participating in the SOA.
  - Service location transparency - The application requesting a service need not know the location of the application providing the service.
  - Platform and communication protocol interoperability - The application requesting a service does not rely on the platform or the communication protocol that is used by the application providing the service.
  - Message interoperability - The application requesting a service does not rely on the message format that is expected by the application providing the service.
- Services are stateless. Every service request is in itself stateless and does not retain resources across service invocations, thereby preserving resources and improving reliability and scalability.
- Service granularity is "right-grained." Services may be fine-grained or coarse-grained depending on the business need and type of service being performed.
- Quality of service is predictable. Services possess performance, scalability, and other systemic qualities. This allows, for example, for planning runtime environments based on known performance characteristics.

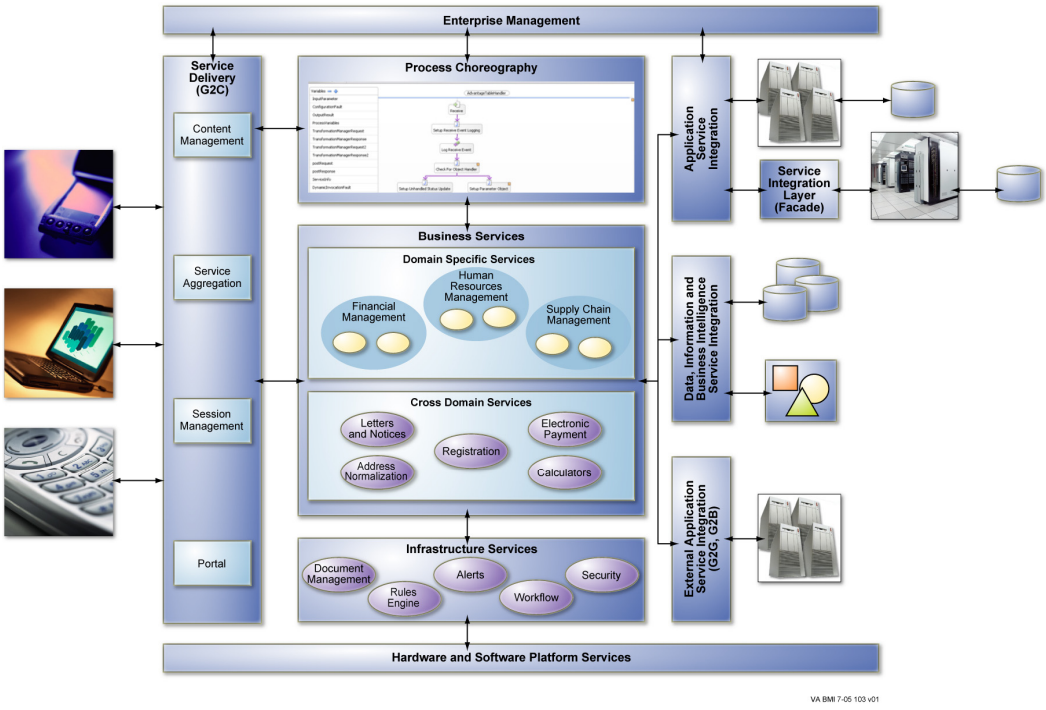
Thus, services can make back-end functionality readily available to clients, but unlike the silo approach, provide building blocks for combining simple services into fully featured, value-added services.

The SOA exploits open standards and technologies to establish a standard middle-tier platform across the enterprise that allows for easy discovery and integration of services to form a business process. Services-oriented architecture involves standardizing middle-tier interface technology such that once implemented, a middle-tier component is available for use by other middle-tier components without complex message reformatting and protocol conversions. Such standardization transforms the middle-tier from being a collection of silos and elevates it instead to being an enterprise-wide services tier.

8.2.3 Solution Overview

A conceptual model for the proposed Team CGI-AMS solution for implementing a service-oriented architecture consists of the components shown in Exhibit 8-7.

Exhibit 8-7 Conceptual Model for a Service-Oriented Architecture



At the core of the proposed solution lie reusable services rather than a collection of applications and their related interfaces.

At the core of the proposed solution lie reusable services rather than a collection of applications and their related interfaces. These services can be categorized as follows:

- **Business Services.** Business services represent business functionality to meet the business needs of the Commonwealth. They encapsulate disparate business functionalities yet share a common substrate and semantics. Since they are decoupled from one another, services can be deployed in whatever configurations are necessary to meet business needs. Further, as business requirements evolve, so can the business services.

  Business services can be further categorized into two groups, depending upon their domain usage:

  - Domain specific services – Services that encapsulate business functions related to a specific domain. For example, processing of a Purchase Order is an ERP Financial domain specific service.
  - Cross-domain services – Services that are common across multiple domains and encapsulate common business functions. For example, correspondence and letter generation is a business service that is not specific to any domain and can be shared across multiple business domains.

- **Infrastructure Services.** Infrastructure Services provide system level support services. For example, authentication/authorization security services, services to send/receive email messages, transaction management services, application clustering services, resource management services, workflow services, etc.

A complex applications infrastructure such as that within the Commonwealth is not made up solely of modern systems that expose business functions as services. There are and will continue to be (for some time to come) Commercial Off-The-Shelf (COTS) applications, legacy applications, and external interfaces that do not expose their business functions as services. In such a situation, there are two options:

- If the applications can be changed and if the Commonwealth chooses to make those changes, the applications can be updated to expose business functions as services.
- In the event that the applications cannot be changed or are not directly under the control of the Commonwealth (COTS or external interfaces), the service integration layer or service facade standardizes the method and semantics of accessing such resources. Once the business service has retrieved the information from the enterprise resources, they can aggregate this information and expose the results as a business service for external consumption. Service integration can be either developed or purchased in the form of a technology or application adapter.

From a strategic perspective, over time the service integration layer or service facades could be replaced by updated application components that directly expose their business functions as services.

Service integration can be broadly categorized into three areas:

- **Application Service Integration.** Provides integration for business applications including existing legacy and COTS applications.
- **Data/Information Service Integration.** Provides integration for data sources (such as OLTP database, data warehouses, and data marts) and business intelligence applications (such as reporting, analytical, and ETL tools). Please reference our Business Intelligence solution in this chapter for information on the types of business functions that can be exposed as services (with or without the service integration layer).
- **External Application Service Integration.** Provides G2G and G2B integration with external agencies and business partners of the Commonwealth.

Another key characteristic of our proposed architecture is the process integration layer. Service invocation at times requires careful choreography of individual service invocation, error handling, workflow, long running transactions and asynchronicity. The process integration layer provides these functions by separating the process control flow (or choreography) from the business service implementation. Business processes can now be built or altered without any impact on the underlying business services. Such business processes can be long running and the process integration layer will manage transactional behavior and state maintenance.

Services can be tailored to a specific user, based on a number of factors, such as the device they are using for access, their location, their indicated preferences, or the type of user they are.

Service delivery deals with the G2C functions within the Commonwealth. The information the Commonwealth business services provides to its citizens must be translated, formatted, and delivered based on the capabilities of the device the citizen utilizes to access the system. Service delivery addresses the way in which services are presented to users. Services can be tailored to a specific user, based on a number of factors, such as the device they are using for access, their location, their indicated preferences, or the type of user they are. All of this is done in conformance with the designated policies. Further, services from the enterprise may need to be aggregated into larger units, presenting the user with a diversity of services on demand. Please reference our Single Window Government Solution in this chapter for more information on the methodology and services proposed by Team CGI-AMS in this space.

Finally, enterprise management activities provide services related to monitoring and management of the enterprise to make sure there is a smooth operation and a consistent Quality of Service (QoS). Activities include configuration management, security policies, infrastructure management, system administration, availability and performance management, and disaster recovery.

Team CGI-AMS believes that a unified, service-oriented architecture with a centralized delivery channel and a common integration layer enables the Commonwealth to evolve an organization that is well-designed and allows IT to deliver a portfolio of services that add value to the business. Our solution provides the Commonwealth with the following benefits:

- **Leveraged existing assets.** Our proposed solution architecture does not require a big-bang implementation. Rather, the emphasis is on incremental migration of existing IT assets into the SOA and setting a long-term goal for service enabling such applications functions.
- **Reduced cost.** Reuse of existing services in creating new business services and a consistent development methodology and operational management provide a lower cost of ownership to the Commonwealth.
- **Risk mitigation.** Reusing existing services for creating new services or business processes reduces the risk of introducing new defects and failures.
- **Process-centric architecture.** The architecture is more process-centric than application-centric, eliminating silos and creating a truly enterprise-wide solution.
- **Compliance to regulatory reforms.** The SOA provides a documented and controlled business process and service interaction. The transparency and audit processes within the SOA can assist the Commonwealth in demonstrating compliance with certain regulatory reforms.

8.2.4 Implementation Approach

Our approach to creating a service-oriented architecture is incremental in nature allowing for gradual technology adoption and leveraging existing investments. The key stages of SOA adoption within our approach are:

- **Current state** – Existing point-to-point interfaces between heterogeneous systems using proprietary interfaces and message exchange formats.
- **Short-to-mid term state** – Implementation of a facade to expose existing business and technology functions and accessibility via a common SOA

infrastructure. This phase eliminates point-to-point interfaces and enables service interaction using open standards interfaces and message formats.

- **Mid-to-long term state** – Implementation of key common infrastructure services that are used by more than one client (service consumer). For example, creating shared security services that provide authentication and authorization functions to various applications within the enterprise.
- **Long term state** – This is the To-Be state where the majority of business and infrastructure functions are exposed as services. Further, new application development is done such that the software components are SOA-ready and do not require the Facade for service interaction.

Implementing the architecture will take place in two phases. In Phase 1 of the Initiative, we will conduct requirements analysis and design (alignment, readiness assessment, technology and tool selection, planning as described below). In Phase 2, we will execute the architecture, and continually evaluate it going forward. This is considered a short term project that can be achieved within 24 months.

8.2.5 Methodology

A service-oriented architecture provides the Commonwealth with an architectural style for developing and deploying enterprise applications. However, there exist multiple ways to realize a SOA. This section outlines our proposed methodology for the Commonwealth to implement a services-oriented architecture.

The SOA methodology consists of the following phases:

- **Alignment.** During this phase Team CGI-AMS will work with the IT and application business owners within the Commonwealth to establish a common working knowledge of SOA principles, concepts, and architectural best practices.
- **Readiness assessment.** We propose using an incremental approach toward an SOA, hence, we need to architect and build services-based applications while maximizing existing investments of the Commonwealth. In keeping with this approach, we will perform an assessment of the existing enterprise environment to determine processes, procedures, infrastructure, and technology architectures.

  The assessment will be used in developing an SOA roadmap that provides the Commonwealth with the following information:

  - Review of the current enterprise applications architecture
  - Proposal of the future SOA environment along with a gap analysis identifying the steps needed to achieve the To-Be state
  - A comprehensive list of potential service candidates eligible for inclusion into the SOA
  - A list of services targeted for initial SOA implementation.

- **Technology and tool selection.** The SOA implementation is tightly integrated with the choice of technology and tools to be used for developing and deploying the SOA. Several factors influence the technology and tool selection:

  - Ease of exposing existing business functionality as services

- Ease of integrating and deploying services to the platform of choice
- Performance and scalability of the runtime environment
- Support for deploying services using multiple technologies, such as web services
- Support for key SOA interoperability standards and specifications
- Conformance to the VEAA ecosystem.

Shown below is a sample list of the available vendors and their products that support building in SOA:

- Oracle - Fusion
- IBM - WebSphere Business Integrator
- BEA - AquaLogic
- Sonic Software - Sonic SOA Suite and Workbench

- **Planning.** Develop a comprehensive implementation plan based upon the readiness assessment and choice of technology platform.
- **Execution.** Deliver prototypes, infrastructure, and services consistent with the SOA implementation plan.
- **Evaluation and ongoing improvement.** Continuous evaluation and improvement to the enterprise architecture by harvesting new sources for service creation and utilization.

8.2.6 Summary

Our proposed architecture provides the Commonwealth with a unified, service-oriented architecture capable of supporting the future of application development.

From a strategic perspective, our proposed architecture provides the Commonwealth with a unified, service-oriented architecture capable of supporting the future of application development.

The main implementation activities for services and the related SOA are designing, selecting the right SOA tools, and building systems using heterogeneous network-callable software components. SOA is an architectural approach consisting of components and interconnections that stress interoperability and location transparency.

Our approach allows the Commonwealth's enterprise applications architecture to evolve following a prudent approach that leverages investments in existing systems. This adaptable, flexible style of architecture provides a solid foundation in the short term and reduces both costs and risks as we build and maintain new enterprise applications over the longer term.

8.3 Single Window Government

Team CGI-AMS recommends a Single Window Government approach for the Commonwealth to provide constituents with multi-channeled access to "joined-up" government services on a one-stop-shopping basis.

Because of rising constituent expectations for access and efficiency, governments everywhere are looking for creative ways to cut costs, streamline operations, and deliver customer-oriented service. To accomplish the shift from a process to a service orientation, Team CGI-AMS recommends the adoption of a Single Window Government approach for the Commonwealth of Virginia.

The primary purpose of SWG is to consolidate the various windows of government such that the citizen-customer is presented with a single window, or one-stop shopping, enabling a view of and access to all services, irrespective of the access method, or channel chosen (physical, voice, Internet). The scope of SWG activity includes consulting and support services relating to organizational structure and development, business strategy and planning, human resources selection and development, and operations monitoring, measuring, and performance improvement.

To achieve full effectiveness, SWG emphasizes an operational service-oriented architecture and environment (organization, staff, process, and purpose). To achieve improved cost efficiency, SWG emphasizes the following strategies:

- Introducing a common purpose (cross-government) platform of web-enabling technologies (the foundation of a service-oriented architecture)
- Introducing business process improvements (BPI) to the front-office aspects of presenting, initiating, and linking services.

The move from a process orientation (within the various operational silos) to an enterprise-wide service orientation is characterized by focusing on the customer and "joining-up" logically related services across the silos. The SWG program simplifies and integrates business processes and data communication horizontally, as well as vertically, across government—based on what a given service or set of services warrants.

An SWG modernization and transformation engagement requires involvement from every level of government—political, executive, administrative, and operational. It requires solid organizational sponsorship because it introduces change that must be managed. At the same time, the SWG exercise takes maximum advantage of existing legacy systems and business processes by interfacing to, or integrating with, these environments.

We propose an SWG pilot focused upon the Performance Planning and Evaluation (Policy 1.40) elements of the Human Resource administration practice within the Commonwealth. This will be a rapid deployment of self-help service for the employee evaluation process, expanding to other similar types of employee-based functionality. We believe that the single window approach can be effectively demonstrated as an "inward-facing" service window (addressing both management and staff as appropriate). In this way the pilot serves as a proof of concept for SWG to be extended to other, citizen-facing services. This approach will also install a very important building block to the foundation of the VEAA and will serve as the springboard for offering a wide array of service delivery improvements throughout the enterprise.

8.3.1 Benefits and Outcomes

First generation e-government relied upon the establishment of one or more web portals for government; essentially these first portals provided an information-only presence. This has evolved to the extent that many portals, representing each department or agency, have been created where all are informational. Some permit single service interactions where the citizen is able to provide information back to government, but few are fully transactional from front-to-back, enabling a connection with the back-office business and legacy systems. Fewer still permit a multi-service experience in a single interaction. The growing multitude of such portals simply perpetuated the 'many windows' view of government, albeit in an electronic version.

From an internal perspective, SWG enables the modernization of business approaches and processes and establishes the opportunity to achieve unprecedented efficiencies and operational savings.

The current generation of e-government (SWG) creates a consolidated view of government departments and service offerings. From a constituent perspective, SWG provides a concentrated, organized, and institutionalized focus on providing effective citizen-centric service. From an internal perspective SWG enables the modernization of business approaches and processes, and establishes the opportunity to achieve unprecedented efficiencies and operational savings. Key outcomes of the SWG process include the following:

- Consolidated, single portal view of all available services at the front end
- Multi-channel deployment—as opposed to multi-deployment channels
- Fully integrated front- and back-office processes; electronic processing from end-to-end
- Services "bundling:" the logical interconnection of services that may span government departments, agencies, and jurisdictions, and even include third-party suppliers
- Improved and more accessible business management information
- Improved business and operational efficiencies—creating opportunities for derived cost savings
- Excellence in service delivery—creating measurably high levels of customer satisfaction.

SWG provides a centralized, coordinated, and multi-channel point-of-access to all government services—both informational and transactional. In addition, SWG provides the methods, tools and operational infrastructure that enable a "define once – deploy many" practice with respect to these services.

As evidenced through real-world experiences, CGI-AMS's SWG program is dramatically successful; it is rapidly deployed, and it supports the government's objectives in establishing a service-oriented architecture as well as actually becoming more service-oriented and customer-friendly. SWG also sets the stage for achieving significant operational cost savings through the provision of a consolidated environment for services presentation management, controlled costs, and contained risks.

The SWG model allows government to make needed operational changes that benefit the public, and government managers and staff equally, with the multi-channel portal being the key enabler of this transformation. SWG portals are built using repeatable frameworks or architectures to reduce risk and support low-cost,

rapid deployment, leading to deeper process improvements and quicker efficiency gains across all contact points—walk-in centers, phone support, traditional mail, and online. Each of these contact points can now move easily from a process to a service orientation.

The portal is the driver for transformation, but transformation itself comes from "joining up" services and pushing them across the government.

While Internet portal architecture can act as the catalyst for cost savings and service improvements—such as drawing customer traffic away from traditional service channels to less expensive ones—it cannot achieve these benefits simply by its existence alone. The efficiencies are found in correspondingly reforming the front- and back-office business processes of government's long-established service delivery channels. In this way, the portal is the driver for transformation, but transformation itself comes from "joining up" services and pushing them across the whole of government.

8.3.2 Methodology and Approach

Team CGI-AMS's recommended transformation process for the Commonwealth occurs in three stages: Analysis and Design, Implementation, and Deployment. There are three fundamental objectives of all three stages: provide results and benefits quickly through a rapid deployment technique; create a working environment demonstrating what and how services are provided in a pragmatic "business case" way; and institutionalize a working philosophy and the principles that support continuous quality improvement.

There are two frameworks applied to the SWG analysis and deployment:

- **Business and Process Framework (BPF)** – The aspects of transformation and change management; dealing with the business strategy, organization, people, and business processes that hold together and drive the SWG objectives forward.
- **Government and Transaction Framework (GTF)** – The operational aspects of being able to define and deploy services to multiple channels, and link these services to legacy environments and third-party services, thus rendering full transactional capability to the single-window scenario.

These frameworks together provide for the rapid deployment of technology, process redesign and the organizational change required to drive lasting change in the way governments provide and deliver services. GTF, the technology component, provides a common architecture and infrastructure for online applications, including business rules and workflow, as well as the platform for integrating agency-specific requirements. BPF, the business process component, goes beyond the technology to create the true and dramatic restructuring of the service delivery process.

8.3.3 Business and Process Framework

BPF tools and techniques support the ability to fast-track the transformation and change management requirements to support a "next generation" e-government initiative. The Business Process Improvement (BPI) focus of the Single Window Methodology defines the business processes required to deliver services and looks at ways to improve these processes from a customer-centric view. Government workers participate through interviews, workshops, reviews, and prioritization sessions.

Similar to the other focus areas across the VEAA, the first step is to identify the activities required to support the first phase of the methodology. There are six major activities in Phase 1: (1) define business processes, specify business process workflow (both the (2) As-Is and (3) To-Be), (4) prototype business processes and the business case, (5) implement fast-track to electronic service delivery (ESD), and (6) test the usability of business processes. USE Case notation is utilized to convey the approach.

The BPF framework methods and tools use 12 models to increase the speed, knowledge transfer and success rate of transformation and performance improvement initiatives. Each model presents a top-level view of the future that can be readily understood by executives, staff, and partners alike. Together, the 12 models form a "collaboration capability" that promotes synergy and effective decision making between experts with different perspectives. This approach enhances success by breaking down traditional barriers that limit effective collaboration, innovation, and consensus.

8.3.4 Government Transaction Framework (GTF)

The GTF technology suite is an easy-to-use framework of capabilities that enable SWG.

The GTF technology infrastructure suite represents a unique combination of web portal, e-commerce catalog, Customer Relationship Management, RM, content management, and workflow management capabilities. The GTF tools readily address the requirements of defining, deploying, and managing e-services in a typical e-government environment. Refined through several years of adaptation within government operations, the GTF tool kit was designed as a flexible framework rather than as a fixed set of discrete applications.

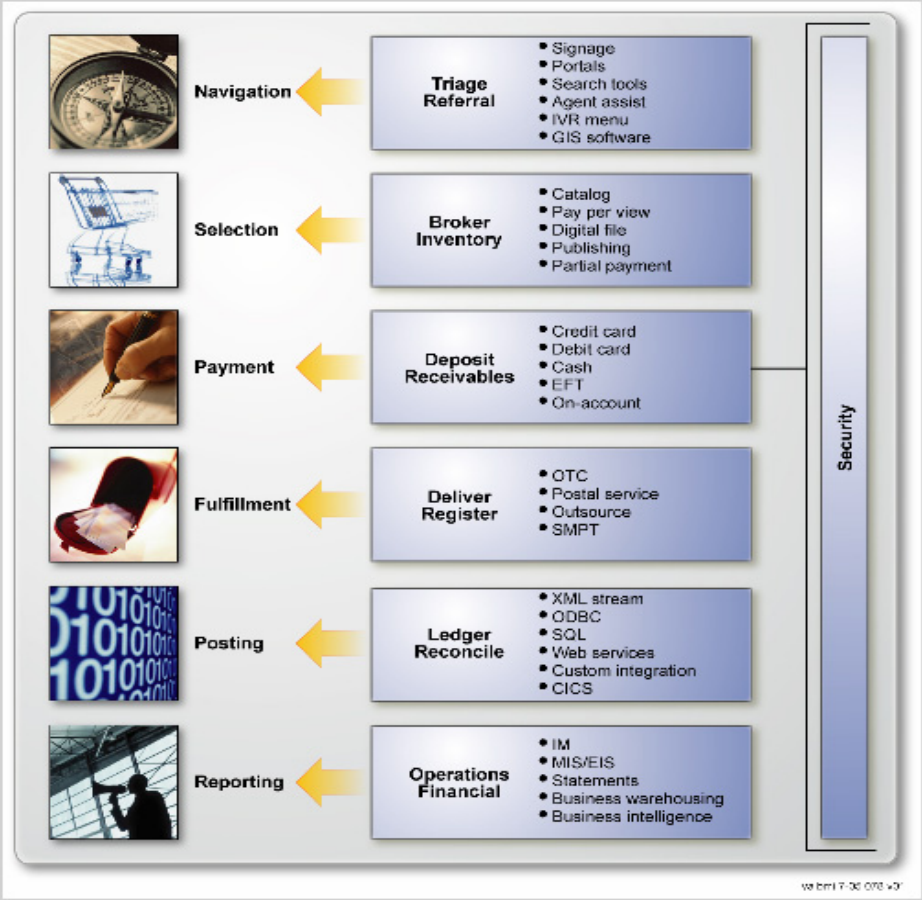
The GTF is built around the concept of a web-accessible service catalog containing government products and services, as well as hyperlinks to other systems. Service catalog entries also contain details that define how each selected service transaction works, supporting data editing, validating, and the application of other business rules as appropriate. Key differentiators for Team CGI-AMS's GTF are these:

- **Rapid deployment** – Existing and reusable process templates
- **Multi-channel utility** – The ability to simultaneously deploy a given service to face-to-face, call center, and web channels. In addition, we are able to respond to both citizen generated requests (Internet users) as well as government internal requests (intranet users) by simply configuring the appropriate authentication and permission management combinations for the service catalog items. This enables staff members (call center, one-stop shopping agents) to access the same service catalog on behalf of a citizen but also access customer history information that would not normally be available to other users.

GTF and its reusable components has become an instrumental and foundational element in defining and establishing a service-oriented architecture.

Exhibit 8-8 depicts the six GTF transaction steps, indicating process, function, and technology aspects. Our experiences analyzing, transforming, and deploying government services, and the discrete transactions that make up these services, have indicated that all services can be addressed by the combination of one or more of these steps. In this regard the GTF, together with its reusable components, has become an instrumental and foundational element in defining and establishing a service-oriented architecture (SOA).

Exhibit 8-8 The Six Basic Steps of a Typical Transaction



Team CGI-AMS has conducted a preliminary mapping of the Virginia Enterprise Business Model against the Single Window Government approach—and it shows a good fit.

GTF Mapped Against the Virginia Enterprise Business Model. Team CGI-AMS conducted a preliminary alignment of the 183 functions defined in the State of Virginia Enterprise Business Model (EBM), with the 6 transactional steps outlined in the Government Transaction Framework (GTF) that underpins the SWG approach. This exercise demonstrates the value of the effort conducted by the Commonwealth, and the thoroughly reusable material contained within the EBM as well as direct correlation with Team CGI-AMS's SWG approach.

To begin, we first aligned the concepts of the EBM and the GTF models as shown in Exhibit 8-9. Generally speaking, the EBM looks at the government from a medium to high level. CGI-AMS's GTF and six transactional steps, on the other hand, works at the medium to low level of government and so focuses on the operational/deployment (services) level.

Exhibit 8-9 EBM – GTF Model Alignment

Commonwealth EBA - Structure	CGI-AMS GTF - Structure
Business Areas	Front Office and Back Office
Lines of Business	Business Domains
Functions	Programs
Not in EBA Scope	Services

As the table demonstrates, the EBA and SWG approaches align fairly closely at the first three levels, but GTF goes one level deeper with the emphasis on services. CGI-AMS's experience has shown that the program or function level is at a higher level of granularity than is practical in terms of conducting service transformation. The functions must be broken down to identifiable and distinguishable constituent services. This level of granularity allows for more manageable "proportions" of service transformation. It permits a constant "streaming" rollout (daily/weekly) of new transformed services rather the traditional periodic (quarterly) release approach of service bundles.

Our analysis creates a straw man service model that takes two functions within the EBA and lists the related services. We identified services through reviewing Commonwealth of Virginia web sites. The services were then mapped to the six GTF functional steps as depicted in Exhibit 8-10.

Exhibit 8-10 Mapping Virginia Services to GTF

EBA Function/GTF Program Level	Services (sampling)Level	Navigation	Selection	Payment	Fulfillment	Posting	Reporting
30 Recreational Resources Management & Tourism	Information about hunting course	x	x				
	Register for hunting course	x	x	x		x	
	Receive hunting training	x	x		x		
	Obtain hunting guidelines	x	x		x		
	Obtain resident hunting license	x	x	x	x	x	x
	Obtain non-resident hunting license	x	x	x	x	x	x
	Obtain trapping license	x	x	x	x	x	x
	Obtain fishing conditions	x	x		x		
	Obtain fishing guidelines and regulation	x	x		x		
	Obtain fresh water fishing license	x	x	x	x	x	x
	Obtain salt water fishing license	x	x	x	x	x	x
	Obtain combination fishing license	x	x	x	x	x	x
	Apply for trophy fish award	x	x		x		
20 Conservation, Marine and Land Management	Provide dam safety information	x	x		x		
	Obtain dam permit information	x	x		x	x	x
	Apply for "adopt-a-stream activity"	x	x		x	x	x
	Obtain state parks information	x	x				
	Reserve park facility	x	x	x	x	x	
	Apply to camp host	x	x		x		

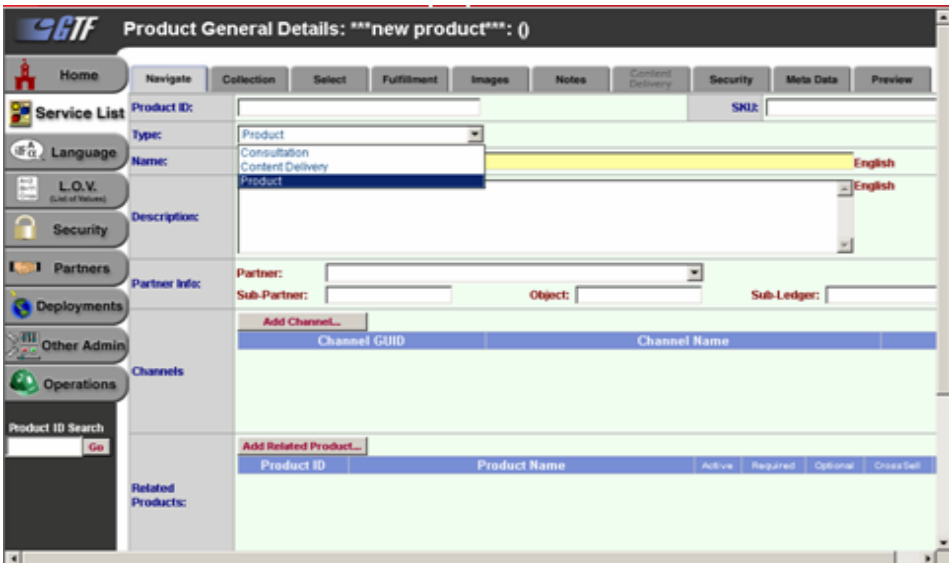
The six GTF steps are a generic baseline that can be readily adapted to any government jurisdiction, such as the Commonwealth of Virginia.

The six GTF steps are a generic baseline that can be readily adapted to any government jurisdiction, such as the Commonwealth of Virginia. For example, in Suffolk County, U.K., CGI-AMS found a variation on the six steps whereby the U.K. central government has defined a standard set of nine steps (referred to as "interaction types") that are to be used as a reference model by all U.K. local governments. In this scenario, CGI-AMS adapted the GTF steps to align with local U.K. needs. This further demonstrates that CGI-AMS's GTF model is flexible and is not limited to, or restricted by the six steps baseline.

8.3.4.1 GTF Functionality and Tools

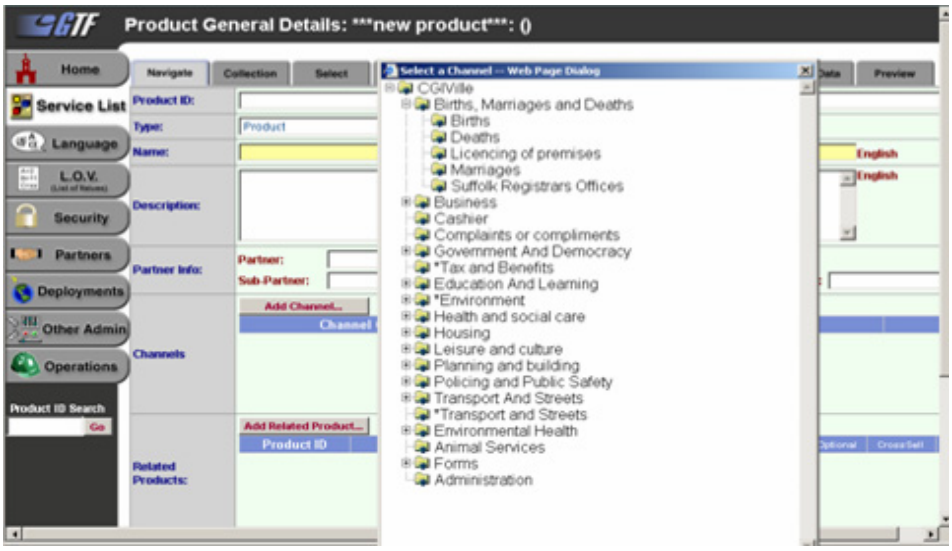
GTF is equipped with a number of web-based administration tools designed for the owner/administrator of the site; these enable the client to define, deploy, and manage the portal and published services as well as prepare and produce the required operations and management reports. Exhibit 8-11 shows a sample view of the management layer.

Exhibit 8-11 Sample GTF Web-based Administrative Tool



GTF also provides a user-friendly interface that allows the builder to define the characteristics and business rules for each product. Each "service" may, in fact, consist of several discrete "products" of logic. Exhibit 8-12 provides another screenshot highlighting this functionality.

Exhibit 8-12 Web-based Administrative Tool Selecting Channels



8.3.4.2 GTF Design Principles and Interfaces

Exhibit 8-13 provides an overview of the GTF design principles and interfaces that allow this framework flexibility to meet the Commonwealth's needs.

Exhibit 8-13 Government Transaction Framework Design Principles

Design Principle	Description
Validation of Input Parameters	All input parameters are type checked and sanity checked. When improper data is received, appropriate exceptions are thrown.
Implementation of Proper Exception Handling Routines	All components catch and publish all possible exceptions. For known exceptions, an internal exception is thrown. Options dealing with and reporting system exceptions, failures, and important events include these: ▪ Windows Event Log Publishing – can be published to any windows event log and event source ▪ Error Log Publishing – can be published to physical error log file. This file can be configured to "roll over" on a daily or monthly basis or not at all ▪ Email Notification – One or more individuals can be configured to be notified via email when an exception occurs
Use of SQL Server Transaction Handling	When a transaction is required, SQL Server is used as the transaction dispenser.
Database Access via the Data Layer Only	When database access is required, the business objects always use the Data Access Layer as the mechanism for communicating with the database.
Communication to Database only through Stored Procedures	There are no instances of SQL code in the objects. All communication is through stored procedures to minimize the possibility of SQL injection and to provide better code flexibility once an application is in production.
Form Generation	Allows users to build complex HTML forms for capturing user input. Can be used later as input to other GTF Products or as information for fulfilling a service.

Design Principle	Description
Fulfillment Management	Fulfilling of a service consists of sending notifications to back-end users, updating legacy systems, etc. GTF supports three types of fulfillments: SMTP, SQL, and Web Service.
User and Permission Management	User authorization is handled through this interface. This includes whatever products and services a user is able to access.
Partner Management/Reporting	Administration of partners, including generation of daily reports (e.g., reconciliation reports, legacy imports, etc.) to each partner, is available.
Site Administration	Manages items such as email notification, lookup tables, language details, configuration data, and displaying of operational information.
Site Deployment	Deployment of GTF products and services across environments (e.g., deployment from test to production)
Operations	Once a site is in production, a number of screens are available to administrators for troubleshooting and performing daily operational type checking.
Legacy Interface	GTF enables seamless legacy interface, including retrieve and/or record information into a number of back-end systems. Examples of legacy integration include validation of account numbers, checking the status of a work order, and updating of back-end financial systems. Multiple methods are available for legacy interface.
Batch Reporting	GTF may be used as a hosting service for other departments, directorates, or external third parties, providing the following capabilities: ▪ Partners can receive regular reports or data files regarding the specific service transactions they are responsible for. ▪ Partners may also have direct access to their transaction statistics through the portal site. ▪ Report or data file templates are designed as per the partner's requirements. ▪ Reports/files can be activated to run in a daily batch process and be emailed to a designated address or FTP'd to a designated location.
Auditing	Several audit tables in the SQL Server database hold information to do the following: ▪ Checking the status of the portal site ▪ Validating transaction history ▪ Checking for failed fulfillments (and re-executing if necessary) ▪ Assisting Service Builders in debugging services ▪ Communication with external web services. All GTF functions and features contain a web-addressable module for administrators wishing to monitor and measure the services and transactions processing environment.

8.3.5 Experiences – Results and References

Once pioneering e-government services are now viewed as essential.

New Brunswick, Canada. Over the past decade, CGI, CGI-AMS's parent company, has helped the Government of New Brunswick pioneer the "one-stop shopping" model for online access to government services. In a report by IDC Canada, which examined the e-government benefits delivered by SNB, the research firm estimated an annual benefit to the province equal to .72 percent of GDP (in this case, $140 million CDN annually). Other highlights of the SNB model's successes include the following accomplishments:

- More than 4 million transactions a year
- Collection of hundreds of million of dollars on behalf of 16 departments and more than 60 municipalities
- Hundreds of different web-based services
- Forty-two percent of transactions conducted through electronic channels
- Satisfaction levels nearly doubled, from 54–92 percent.

The trend toward increasing web use is apparent. From 1999 to 2003, web use grew from 6–32 percent, while over-the-counter service decreased from 86–60 percent. Clearly, once pioneering e-government services are now viewed as essential.[3]

Suffolk County, United Kingdom. Drawing heavily on the experience of delivering customer-oriented services in New Brunswick, CGI-AMS is replicating its success in other locations. For example, through a partnership with Suffolk County Council, Mid Suffolk District Council, and British Telecom, CGI-AMS is helping transform Suffolk's local government services—adding 172 services in the initial release, with an average 20 percent savings in delivery costs for these services—through implementing an Internet portal platform, call center, and over-the-counter service center.

8.3.6 Implementation Plan

The proposed action plan for VEAA is designed to establish a solid foundation for future business process reengineering. The recommended three-phased approach allows the Commonwealth to continually measure progress and success within a single phase, and also provides the ability for the Commonwealth to easily adjust priorities as appropriate in an ongoing manner. More specifically, aspects of the recommended action plan that SWG directly addresses are:

- **Quick Wins.** Projects that could be completed quickly (e.g., within six to nine months) and provide measurable improvement to enterprise business processes are given highest priority.
- **Foundational.** Projects that are foundational in nature, for example, a common enterprise business intelligence framework and a service-oriented architecture are given high priority.
- **Cost savings.** Within the prioritization process, projects that deliver cost savings and improved efficiency (process) potential.

[3] *From Vision to Benefit. eGovernment Solutions Study: The New Brunswick Case.* IDC Canada Consulting, May 2003.

We propose an SWG pilot focused upon the Performance Planning and Evaluation elements of the Commonwealth's Human Resource administration.

We propose an SWG pilot focused upon the Performance Planning and Evaluation elements of the Human Resource administration practice within the Commonwealth. This will be a rapid deployment of self-help service for the employee evaluation process, expanding to other similar types of employee-based functionality. We believe that the single window approach can be effectively demonstrated as an "inward-facing" service window (addressing both management and staff as appropriate). In this way the pilot serves as a proof of concept for SWG to be extended to other, citizen-facing services. This approach will also install a very important building block to the foundation of the VEAA and will serve as the springboard for offering a wide array of service delivery improvements throughout the enterprise.

In conducting requirements analysis, we will provide the Commonwealth team with a plan for the initial pilot of the SWG platform. This will show a clear sense of ESD platform requirements as well as specific process steps, interfaces, and/or integrations necessary to achieve process improvement.

In moving from Requirements Definition to the Implementation stage we would follow on with pilot activities that would clearly demonstrate the foundational nature of SWG (methods, tools, and technologies), and the inherent use of a service-oriented architecture (and components) within the SWG approach. Team CGI-AMS proposes using a standard project methodology for these pilot programs. Specific timeframes for each activity would be finalized during the requirements phase.

The SWG transformation approach enables the ability to interface or integrate (as appropriate) with current legacy business systems.

It should be noted that that the SWG transformation approach enables the ability to interface or integrate (as appropriate) with current legacy business systems, leading to cost saving through reduced efforts for many of the current data capture/entry requirements. This would provide a Phase 2 contribution to cost saving and avoidance during the period of identifying, selecting, and implementing an integrated solution to HR/Payroll in particular.

For additional implementation details, please see the Roadmap in Chapter 9.

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